

**From:** Ken Burraston <KBurraston@formfactor.com>  
**To:** "Micheal V. Messinger (E-mail)" <mikem@skgf.com>  
**Date:** 6/29/01 2:22PM  
**Subject:** P148 - High Density Package Application

Mike,

Attached are comments to the draft application you sent for the above disclosure. (Note that our internal reference number is P148 rather than P147.) Also attached are some additional background materials:

1. P148 Figs. A-C.pdf - Three figures that accompany the comments.
2. US Patent No. 5,917,707, which illustrates FormFactor's wirebond style spring contacts.
3. PCT publication WO 00/33089, which illustrates one version of FormFactor's lithographically formed spring contacts.
4. P148 Sample Discussion Of Springs - contains brief description of FormFactor's three basic styles of springs
5. P148 Spring Figures - contains figures illustrating FormFactor's three basic styles of springs.

I'll call you to talk you through the comments.

By the way, don't let the number comments scare you. We are happy with both applications you send to us. Reasons for the comments include:

- in addition to the inventor, engineering management usually reviews applications and typically has many comments about every application;
- while reviewing the applicaiton, the inventor or someone invariably thinks of something to add to the application that was not in the original disclosure; and
- due to the trend at the Federal Circuit to limit claims to not much broader scope than the disclosed embodiments, we are making an effort to identy additional alternative embodiments and configurations as we review draft applications. We usually don't think of the alternatives until reviewing a draft application.

<<Comments To First Draft.doc>> <<P148 Figs. A-C.pdf>> <<P148 Sample Discussion Of Springs.doc>> <<P148 Spring Figures.pdf>>

<<5917707 P2.pdf>> <<WO0033089 P74PCT.pdf>>

B1

**STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.**

ATTORNEYS AT LAW  
1100 New York Avenue, N.W.  
Suite 600  
Washington, D.C. 20005-3934

**Facsimile Cover Sheet**

urgent ☐ return reply requested ☐ original will be sent as confirmation ☐

**DATE:** July 13, 2001

**PHONE NO.:** (925) 294-8147

**PAGES:** 7 ~~N~~ (including this cover sheet)

**TO:** FormFactor Inc.

**ATTN:** Patti Crowder

**FROM:** Joan Hall

**RE:** Drawing Figures

**OUR REF:** 2026.0030000

**MESSAGE**

Pleasure speaking with you today.

Here are the drawings that Mike Messinger wanted forward.

My direct telephone number is 202-789-5537. Email address: [jhall@skgf.com](mailto:jhall@skgf.com)

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B2

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\*LIMITED TO MATTERS  
AND PROCEEDINGS BEFORE  
FEDERAL COURTS & AGENCIES  
\*\*REGISTERED PATENT AGENT  
\*\*\*SENIOR COUNSEL

**WRITER'S DIRECT NUMBER:**

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**INTERNET ADDRESS:**

MIKEM@SKGF.COM

July 23, 2001

N. Kenneth Burraston,  
Chief Patent Counsel  
**FormFactor, Inc.**  
5666 La Ribera Street  
Livermore, CA 94550

*Via Federal Express*

330 3481 851

Re: Final Draft U.S. Patent Application  
For: **Electronic Package with Direct Cooling of Active Electronic Components**  
Inventor: Chuck Miller  
Our Ref: 2026.0030000

Dear Ken:

Enclosed please find the final draft of the U.S. patent application for the above-referenced matter. The application has been revised in accordance with your comments and the comments of the inventor. Thus, the application should now be in condition for filing with the U.S. Patent and Trademark Office (USPTO).

We request that the inventor review the enclosed application. If the application meets his approval, then we request that you prepare and have executed the following documents:

1. ***A Combined Declaration and Power of Attorney.*** Please have all inventors carefully review the Declaration/Power of Attorney document with any information that we have entered onto it. The inventors should fill in any missing information in blue ink. By "residence" address is

B3

N. Kenneth Burraston  
July 23, 2001  
Page 2

meant the city and state of residence, or, if residence is not in the United States, city and country of residence. The "mailing" address is the (full) address at which the inventor customarily receives mail; either the home or business address is acceptable as a mailing address. After the inventors have completed the review of the patent application, any amendments, and Declaration/Power of Attorney, and if the information in the Declaration/Power of Attorney is correct and complete, all inventors should **sign and date** the Declaration/Power of Attorney in blue ink where indicated. If any corrections are made, please initial and date the corrections in the margin.

2. **An Assignment.** Please have the inventors who are assigning their rights review the Assignment document. In the body of the Assignment, in the blank space after the words "... executed by the undersigned on \_\_\_\_\_," the inventors should enter the date that they signed the **Declaration**. Then, the inventors should sign and date the bottom of the Assignment document in blue ink.

Every person who signs a document that is submitted to the USPTO makes a certification under 37 C.F.R. § 10.18(b). A copy of 37 C.F.R. § 10.18(b) and (c) is attached. Every individual who signs documents should review this rule.

Please return the enclosed application (including the drawings) and the executed formal documents to us so that we may file them with the USPTO. Please use an overnight courier, such as Federal Express, to send these papers to us. Our goal is to file the application with the USPTO as soon as possible. Thus, we request that you attend to this matter at your earliest convenience.

A duty of disclosure continues throughout the entire patent application process, and ends only with the actual issuance of a patent. Therefore, if anyone substantively involved in the patent application process becomes aware of information that might be considered material, please forward it to us immediately. If there is information to submit, USPTO rules provide certain advantages to the applicant if the information is submitted within three months of the filing of the application, or before the examiner issues an office action on the merits, whichever is later.

Please note that most countries require absolute novelty of the invention. Therefore, if you have any interest in filing this subject matter outside of the United States, please let us know as soon as possible, preferably prior to any disclosure or submission (written, oral, or electronic) of the subject matter to a third party.

B4

N. Kenneth Burraston

July 23, 2001

Page 3

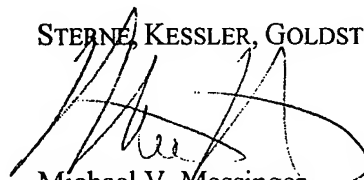
Also, unless we request otherwise when the application is filed, this application will be published approximately 18 months from its earliest U.S. non-provisional filing date. If the invention has not been and will not be the subject of an application filed in another country (or under international agreement) that requires eighteen-month publication, then the applicant can request that the application not be published.

While the non-publication request may be rescinded at any time, you should not file a non-publication request if you intend to internationally file this application. If the application is subsequently filed in another country (or under international agreement) that requires eighteen-month publication, we must notify the USPTO within forty-five (45) days or the application will become abandoned. Because the vast majority of applications are filed both in the United States and outside of the United States, we will **not** file a non-publication request unless we have your express instructions to do so.

Please contact us if you have any questions or comments regarding the foregoing.

Very truly yours,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.



Michael V. Messinger

MVM:jmh

Enclosures

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Date: August 1, 2001

Total No. of Pages: 36  
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To: Michael V. Messinger, Esq.  
Sterne, Kessler, Goldstein & Fox, P.L.L.C.  
Fax: (202) 371-2540  
Phone: (202) 371-2667

From: Stuart L. Merkadeau, Esq.  
Direct Dial (925) 456-7355  
Email: [smerkadeau@formfactor.com](mailto:smerkadeau@formfactor.com)

Re: U.S. Patent Application  
Title: Electronic Package With Direct Cooling Of Active Electronic Components  
Inventor: Miller  
SKG&F Ref.: 2026.0030000  
FFI Ref.: P155-US

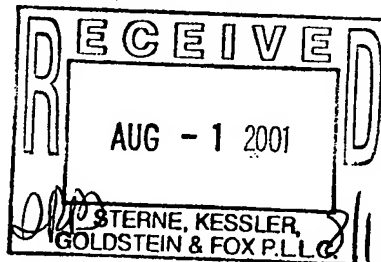
Dear Mike -

Attached please find a demarcated copy of the referenced application.

Best regards,

A handwritten signature of Stuart L. Merkadeau in black ink.  
Stuart L. Merkadeau

ORIGINAL



*mm*

B6

5666 La Ribera Street  
Livermore, CA 94550  
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---

**To:**           **Name:**       Joan Hall For Michael V. Messinger, Esq.  
                  **Company:**   Sterne, Kessler, Goldstein & Fox, P.L.L.C.  
                  **Fax:**         (202) 371-2540  
                  **Phone:**      (202) 371-2667

**From:**        Patti Crowder for Stuart Merkadeau, Esq.  
                  FormFactor, Inc.  
                  **Phone:** (925) 456-3811

**Re:**           **Your Ref:** 2026.0030000  
                  **Our Ref:** P155-US

**Total Pages:** ( 2 ) page(s) - including cover sheet

**Date:**         August 7, 2001

---

Joan -

Per our conversation of this morning, attached please find the missing page 7 from the above-referenced matter.

If you have any questions or need any further assistance, please feel free to contact me at the number above.

Thanks,  
Patti Crowder  
Secretary to Stuart Merkadeau

B7

**STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.**

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\*LIMITED TO MATTERS  
AND PROCEEDINGS BEFORE  
FEDERAL COURTS & AGENCIES  
\*\*REGISTERED PATENT AGENT  
\*\*\*SENIOR COUNSEL

August 15, 2001

WRITER'S DIRECT NUMBER:  
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INTERNET ADDRESS:  
MIKEM@SKGF.COM

N. Kenneth Burraston  
Chief Patent Counsel  
FormFactor, Inc.  
5666 La Ribera Street  
Livermore, CA 94550

*Via Federal Express*

Ref: 2026.0030000  
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Re: Final Draft U.S. Patent Application  
For: Electronic Package with Direct Cooling of Active Electronic  
Components  
Inventor: Chuck Miller  
Our Ref: 2026.0030000  
Your Ref: P155-US

Dear Ken:

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We request that the inventor review the enclosed application. If the application meets his approval, then we request that you prepare and have executed the following documents: a Declaration, Assignment, and a Power of Attorney from Assignee with an accompanying Statement under 37 C.F.R. § 3.73(b).

Please return the enclosed application (including the drawings) and any executed formal documents to us so that we may file them with the USPTO. Please use an overnight courier, such as Federal Express, to send these papers to us. Our goal is to file the application with the

B8



N. Kenneth Burraston  
August 15, 2001  
Page 2

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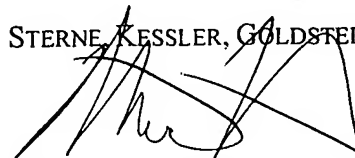
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Please contact us if you have any questions or comments regarding the foregoing.

Very truly yours,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.

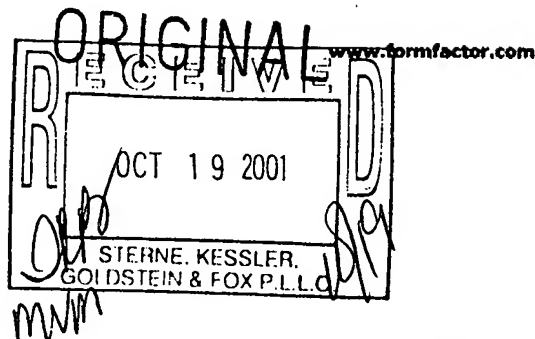


Michael V. Messinger

MVM:jmh  
Enclosures  
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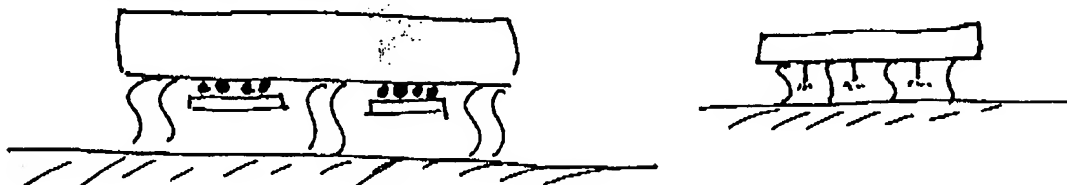
To: Michael V. Messinger, Esq.  
Sterne, Kessler, Goldstein & Fox, P.L.L.C.  
Fax: (202) 371-2540  
Phone: (202) 371-2667

From: Stuart L. Merkadeau, Esq.  
Direct Dial: (925) 456-7355  
Email: [smerkadeau@formfactor.com](mailto:smerkadeau@formfactor.com)

Re: U.S. Patent Application  
Title: Electronic Package With Direct Cooling Of Active Electronic Components  
Inventor: Miller  
SKG&F Ref: 2026.0030000  
FFI Ref: P155-US

Dear Mike -

Following on my email, below please find a proposed stacked die arrangement for Fig. 4, as well as a figure to explain my comment on ¶ 58.



Best regards,

Stuart L. Merkadeau

B10

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Date: October 19, 2001

Total No. of Pages: 1  
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Sterne, Kessler, Goldstein & Fox, P.L.L.C.  
Fax: (202) 371-2540  
Phone: (202) 371-2667

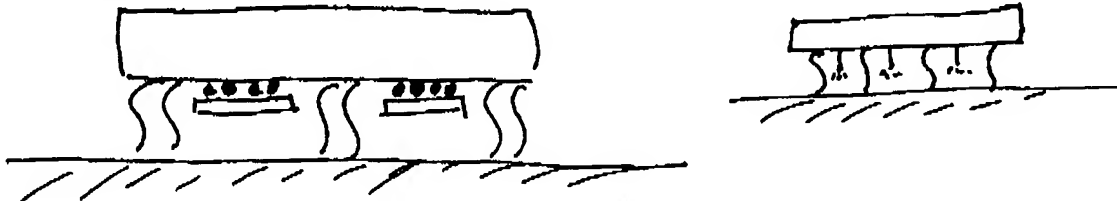
From: Stuart L. Merkadeau, Esq.  
Direct Dial: (925) 456-7355  
Email: [smerkadeau@formfactor.com](mailto:smerkadeau@formfactor.com)

Re: U.S. Patent Application  
Title: Electronic Package With Direct Cooling Of Active Electronic Components  
Inventor: Miller  
SKG&F Ref.: 2026.0030000  
FFI Ref.: P155-US

---

Dear Mike --

Following on my email, below please find a proposed stacked die arrangement for Fig. 4, as well as a figure to explain my comment on ¶ 58.



Best regards,

Stuart L. Merkadeau

B11

**Michael Messinger - Re: P148 and P155 2026.002000 and 2026.0030000**

**From:** Michael Messinger  
**To:** "smerkadeau@formfactor.com".INTERNET.SKGF\_DOM  
**Date:** 10/19/2001 2:50 PM  
**Subject:** Re: P148 and P155 2026.002000 and 2026.0030000  
**CC:** "KBurraston@formfactor.com".INTERNET.SKGF\_DOM; Rob Sterne

Stuart,

Thank you for the comments. We will review and let you know if we have any further questions.

Best regards,  
 Mike

Michael Messinger, Esq.  
 Sterne, Kessler, Goldstein & Fox  
 1100 New York Ave. NW Ste. 600  
 Washington, DC 20005  
 202-371-2667  
 202-371-2540 (facsimile)  
 www.skgf.com  
 Secretary (Ms. Joan Hall): 202-789-5537

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>>> Stuart Merkadeau <smerkadeau@formfactor.com> 10/19/01 02:09PM >>>  
 Hi Mike -

This email provides comments on the most recent drafts of the identified patent applications.

P155:

- \*In ¶¶ 4-13, we should mention stacked die. I believe the embodiment in ¶ 9 is a good place to mention stacked die.
- \*In ¶ 15, I would rather not make this Fig. 1. I understand the "technical" reason for including the figure, but I would prefer to discuss the flowchart after the discussion of the basic structure (i.e., after Figs. 1-3).
- \*In ¶ 18, please note that Fig. 3B and the accompanying explanation is a feature of the invention, but not a requirement. That is, Fig. 3B appears to just depict a gas law.
- \*In ¶ 29, the definition of "die" should include "any integrated circuit, chip silicon chip or other semiconductor or electronic device."
- \*In ¶ 58, Please include an embodiment in which non-contacting springs are also present to conduct heat away from small areas on the die surface. These springs would, for example, extend down from the die between and around the springs that contact to the substrate.
- \*Fig. 1 should be moved (as noted above).
- \*In Fig. 4, let's show a stacked die arrangement, e.g., flip chip and springs. I will fax a simple drawing that can be incorporated into Fig. 4, and then we will need to add some text as well.
- \*Fig. 6 is missing the PCB (compare to Fig. 5).

P148:

- \*Fig. 1 and the accompanying description in ¶¶ 4-5 is a bit misleading. I would change tester 100 to test system, and change computer 150 to tester 150. The spec. should also be checked to confirm consistency. (As an aside, we would not want Fig. 1 to appear on the face of the issuing patent. Does this mean we should move figures around now?).
- \*Also note the changes identified in P155 and make similar

B12

corrections as appropriate.

If you have any questions, please feel free to call.

Best regards,

- Stuart

Stuart L. Merkadeau  
Vice President, Intellectual Property  
FormFactor, Inc.  
5666 La Ribera Street  
Livermore, CA 94550  
Direct Dial: 925-456-7355  
Cell: 925-784-2245  
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\*LIMITED TO MATTERS  
AND PROCEEDINGS BEFORE  
FEDERAL COURTS & AGENCIES  
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\*\*\*SENIOR COUNSEL

November 7, 2001

**WRITER'S DIRECT NUMBER:**

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N. Kenneth Burraston,  
Chief Patent Counsel  
**FormFactor, Inc.**  
2140 Research Drive  
Livermore, CA 94550

*Via Federal Express*

336 8673 052

Re: Final Draft U.S. Patent Application  
For: **Electronic Package with Direct Cooling of Active Electronic Components**

Inventor: Chuck Miller  
Our Ref: 2026.0030000

Dear Ken:

Enclosed please find the final draft of the U.S. patent application for the above-referenced matter. The application has been revised in accordance with all of the comments provided to us to date. Thus, the application should now be in a condition for filing with the U.S. Patent and Trademark Office (USPTO).

We request that the inventor review the enclosed application. If the application meets his approval, then return the enclosed application (including the drawings) and executed formal documents to us so that we may file them with the USPTO. Please use an overnight courier, such as Federal Express, to send these papers to us. Our goal is to file the application with the USPTO as soon as possible. Thus, we request that you attend to this matter at your earliest convenience.

B14

N. Kenneth Burraston  
November 7, 2001  
Page 2

A duty of disclosure continues throughout the entire patent application process, and ends only with the actual issuance of a patent. Therefore, if anyone substantively involved in the patent application process becomes aware of information that might be considered material, please forward it to us immediately. If there is information to submit, USPTO rules provide certain advantages to the applicant if the information is submitted within three months of the filing of the application, or before the examiner issues an office action on the merits, whichever is later.

Please note that most countries require absolute novelty of the invention. Therefore, if you have any interest in filing this subject matter outside of the United States, please let us know as soon as possible, preferably prior to any disclosure or submission (written, oral, or electronic) of the subject matter to a third party.

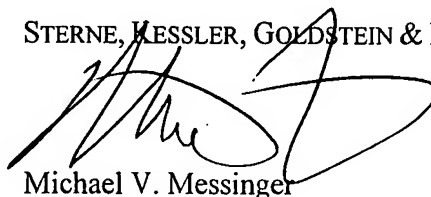
Also, unless we request otherwise when the application is filed, this application will be published approximately 18 months from its earliest U.S. non-provisional filing date. If the invention has not been and will not be the subject of an application filed in another country (or under international agreement) that requires eighteen-month publication, then the applicant can request that the application not be published.

While the non-publication request may be rescinded at any time, you should not file a non-publication request if you intend to internationally file this application. If the application is subsequently filed in another country (or under international agreement) that requires eighteen-month publication, we must notify the USPTO within forty-five (45) days or the application will become abandoned. Because the vast majority of applications are filed both in the United States and outside of the United States, we will **not** file a non-publication request unless we have your express instructions to do so.

Please contact us if you have any questions or comments regarding the foregoing.

Very truly yours,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.



Michael V. Messenger

MVM:jmh  
Enclosures

B15

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Date: November 30, 2001

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To: Michael V. Messinger, Esq.  
Sterne, Kessler, Goldstein & Fox, P.L.L.C.  
Fax: (202) 371-2540  
Phone: (202) 371-2667

From: Stuart L. Merkadeau, Esq.  
Direct Dial: (925) 456-7355  
Email: [smerkadeau@formfactor.com](mailto:smerkadeau@formfactor.com)

Re: U.S. Patent Application  
Title: Electronic Package With Direct Cooling Of Active Electronic Components  
Inventor: Miller  
SKG&F Ref.: 2026.0030000  
FFI Ref.: P148-US

---

Dear Mike --

Following on my email, attached please find demarcated versions of FIGS. 5 and 6 of the referenced application.

On a bookkeeping note, I believe my email may have included incorrect file references. Your Ref. 2026.003000 is our ref. P148-US; your Ref. 2026.0020000 is our ref. P155-US.

Best regards,

A handwritten signature in black ink, appearing to be 'S Merkadeau'.

Stuart L. Merkadeau

B16



**From:** "Patti Crowder" <pcrowder@formfactor.com>  
**To:** "Joan Hall" <JHALL@skgf.com>  
**Date:** 12/13/01 8:14PM  
**Subject:** RE: 2026.0020000 & 2026.0030000

Hi Joan -

Below is the information you requested:

Charles A. Miller  
48881 Semillon Drive  
Fremont, CA 94539 USA  
US Citizen

FFI is incorporated in the State of Delaware.

If you need anything else, please feel free to contact me.

Thanks,  
Patti

-----Original Message-----

From: Joan Hall [mailto:JHALL@skgf.com]  
Sent: Thursday, December 13, 2001 4:49 PM  
To: pcrowder@formfactor.com  
Cc: Michael Messinger  
Subject: 2026.0020000 & 2026.0030000

I am preparing formal papers for these applications. I need inventor Chuck Miller, complete address and citizenship. Additionally, I need to know what state FormFactor, Inc. was incorporated in.

Thanks.

**CC:** "Michael Messinger" <MIKEM@skgf.com>

B17

**STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.**

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\*LIMITED TO MATTERS  
AND PROCEEDINGS BEFORE  
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\*\*\*SENIOR COUNSEL

December 14, 2001

**WRITER'S DIRECT NUMBER:**

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N. Kenneth Burraston,  
Chief Patent Counsel  
**FormFactor, Inc.**  
2140 Research Drive  
Livermore, CA 94550

*Via Federal Express*

Re: Final Draft U.S. Patent Application  
For: **Electronic Package with Direct Cooling of Active Electronic Components**  
Inventor: Chuck Miller  
Our Ref: 2026.0030000  
Your Ref: P148-US

Dear Ken:

Enclosed please find the final draft of the U.S. patent application for the above-referenced matter. Also enclosed are a complete Declaration and Power of Attorney and a completed Assignment.

The application has been revised in accordance with all of the comments provided to us to date. Thus, the application should now be in a condition for filing with the U.S. Patent and Trademark Office (USPTO).

We request that you and inventor(s) review the enclosed application. If the application meets with the approval of all of you, then we request that inventor(s) execute the Declaration and Power of Attorney and the Assignment.

B18

N. Kenneth Burraston  
December 14, 2001  
Page 2

Accordingly, the following documents are enclosed:

1. ***A Declaration.*** Please have all inventors carefully review the Declaration and any information that we have entered onto it and fill in any missing information in blue ink. By "residence" address is meant the city and state of residence, or, if residence is not in the United States, city and country of residence. The "mailing" address is the (full) address at which the inventor customarily receives mail; either the home or business address is acceptable as a mailing address. After the inventors have completed the review of the patent application, any amendments, and Declaration, and if the information in the Declaration is correct and complete, all inventors should **sign and date** the Declaration in blue ink where indicated. If any corrections are made, please initial and date the corrections in the margin.
2. ***An Assignment.*** Please have the inventors who are assigning their rights review the Assignment document. In the body of the Assignment, in the blank space after the words "... executed by the undersigned on \_\_\_\_\_," the inventors should enter the date that they signed the ***Declaration***. Then, the inventors should sign and date the bottom of the Assignment document in blue ink.
3. ***Certificate Under 37 C.F.R. § 3.73(b).*** With this document, the assignee informs the USPTO examination branch of the assignee's ownership rights, and establishes the name and title of the assignee's representative whose signature will bind the assignee in actions the assignee takes in front of the USPTO (for example, the submission of a Power of Attorney or Terminal Disclaimer). The person signing this document must have the authority to bind the assignee. This document should be signed **after** the inventors assign their rights.
4. ***A Power of Attorney from Assignee.*** This document grants a power of attorney to prosecute this patent application, and certain other related applications to the listed attorneys. This document should be reviewed, and signed and dated in blue ink by the same person who signs the Certificate under 37 C.F.R. § 3.73(b). This document should be signed **after** the inventors assign their rights.

Every person who signs a document that is submitted to the USPTO makes a certification under 37 C.F.R. § 10.18(b). A copy of 37 C.F.R. § 10.18(b) and (c) is attached. Every individual who signs one of the enclosed documents should review this rule.

B19

N. Kenneth Burraston  
December 14, 2001  
Page 3

Please return the enclosed application (including the drawings) and the executed formal documents to us so that we may file them with the USPTO. Please use an overnight courier, such as Federal Express, to send these papers to us. The application must be filed with the USPTO as soon as possible, preferably by **December 26, 2001**. Thus, we request that you attend to this matter at your earliest convenience.

A duty of disclosure continues throughout the entire patent application process, and ends only with the actual issuance of a patent. Therefore, if anyone substantively involved in the patent application process becomes aware of information that might be considered material, please forward it to us immediately. If there is information to submit, USPTO rules provide certain advantages to the applicant if the information is submitted within three months of the filing of the application, or before the examiner issues an office action on the merits, whichever is later.

Please note that most countries require absolute novelty of the invention. Therefore, if you have any interest in filing this subject matter outside of the United States, please let us know as soon as possible, preferably prior to any disclosure or submission (written, oral, or electronic) of the subject matter to a third party.

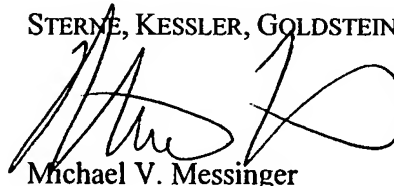
Also, unless we request otherwise when the application is filed, this application will be published approximately 18 months from its earliest U.S. non-provisional filing date. If the invention has not been and will not be the subject of an application filed in another country (or under international agreement) that requires eighteen-month publication, then the applicant can request that the application not be published.

While the non-publication request may be rescinded at any time, you should not file a non-publication request if you intend to internationally file this application. If the application is subsequently filed in another country (or under international agreement) that requires eighteen-month publication, we must notify the USPTO within forty-five (45) days or the application will become abandoned. Because the vast majority of applications are filed both in the United States and outside of the United States, we will **not** file a non-publication request unless we have your express instructions to do so.

Please contact us if you have any questions or comments regarding the foregoing.

Very truly yours,

STERNE, KESSLER, GOLDSTEIN & FOX P.L.L.C.



Michael V. Messinger

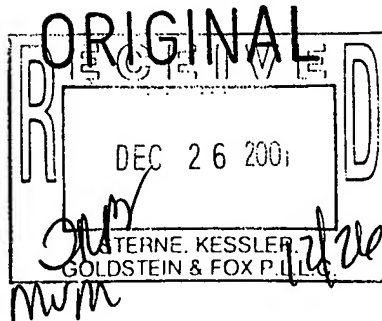
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Date: December 21, 2001

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Email: [smerkadeau@formfactor.com](mailto:smerkadeau@formfactor.com)

Re: U.S. Patent Application  
Title: Electronic Package With Direct Cooling Of Active Electronic Components  
Inventor: Miller  
SKG&F Ref.: 2026.0030000  
FFI Ref.: P148-US

Mike -

Attached please find the fully executed Declaration and Power of Attorney in the above referenced case.

Thank you,

Patti Crowder  
For Stuart L. Merkadeau

B21